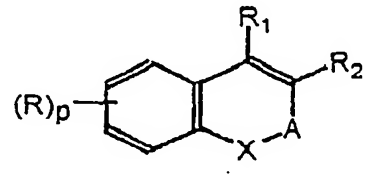
CLAIMS

1. The use of a pentadienoic acid derivative of formula (I) for the preparation of a medicament for the prevention or treatment of hyperuricemia and/or one or several associated disorders or diseases, and/or for reducing the serum uric acid level of a subject.



(I)

in which:

X represents O or S;

A represents either the divalent radical $-(CH_2)_s-CO-(CH_2)_t-$ or the divalent radical $-(CH_2)_s-CR_3R_4-(CH_2)_t-$

in which radicals s = t = 0 or else one of s and t has the value 0 and the other has the value 1;

R_4 represents a hydrogen atom or a (C_1-C_{15})alkyl group;

R_1 and R_2 independently represent the Z chain defined below; a hydrogen atom; a (C_1-C_{18})alkyl group; a (C_2-C_{18})alkenyl group; a (C_2-C_{18})alkynyl group; a (C_6-C_{10})aryl group optionally substituted by a halogen atom, by an optionally halogenated (C_1-C_5)alkyl group or by an optionally halogenated (C_1-C_5)alkoxy group; or a mono- or bicyclic (C_4-C_{12})heteroaryl group comprising one or more heteroatoms chosen from O, N and S which is optionally substituted by a halogen atom, by an optionally halogenated (C_1-C_5)alkyl group or by an optionally halogenated (C_1-C_5)alkoxy group;

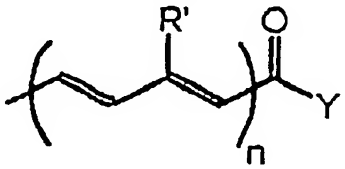
R_3 and R_4 independently takes any one of the meanings given above for R_1 and R_2, with the exception of the Z chain; or else

R_3 and R_4 together form a (C_2-C_6)alkylene chain optionally substituted by a halogen atom or by optionally halogenated (C_1-C_5)alkoxy;

R is chosen from a halogen atom; a cyano group; a nitro group; a carboxy group; an optionally halogenated (C_1-C_{18})alkoxycarbonyl group; an R_a-CO-NH- or R_aR_bN-CO- group [in which R_a and R_b independently represent optionally halogenated (C_1-C_{18})alkyl; a hydrogen atom; (C_6-C_{10})aryl or (C_6-C_{10})aryl(C_1-C_5)alkyl (where the aryl parts are optionally substituted by a halogen atom, by an optionally halogenated (C_1-C_5)alkyl group or by an optionally halogenated (C_1-C_5)alkoxy group); (C_3-C_{12})cycloalkyl optionally substituted by a halogen atom, by an optionally halogenated C_1-C_5 alkyl [sic] group or by an optionally halogenated (C_1-C_5)alkoxy group]; an optionally halogenated (C_1-C_{18})alkyl group; optionally halogenated (C_1-C_{18})alkoxy; and (C_6-C_{10})aryl, (C_6-C_{10})aryl(C_1-C_5)alkyl, (C_6-C_{10})aryloxy, (C_3-C_{12})cycloalkyl, (C_3-C_{12})cycloalkenyl, (C_3-C_{12})cycloalkyloxy or (C_3-C_{12})cycloalkenyloxy in which the aryl, cycloalkyl and cycloalkenyl parts are optionally substituted by a halogen atom, by optionally halogenated (C_1-C_5)alkyl or by optionally halogenated (C_1-C_5)alkoxy;
-OH;

p represents 0, 1, 2, 3 or 4;

Z represents the radical:



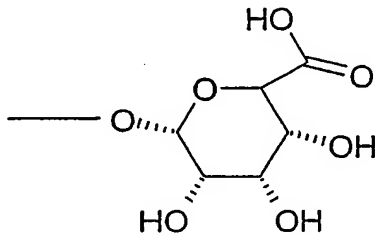
where n is 1 or 2;

the R' groups independently represent a hydrogen atom; a (C_1-C_5)alkyl group; a (C_6-C_{10})aryl group optionally substituted by a halogen atom, by an optionally halogenated (C_1-C_5)alkyl group or by optionally halogenated (C_1-C_5)alkoxy; or a mono- or bicyclic (C_4-C_{12})heteroaryl group comprising one or more heteroatoms chosen from O, N and S which is optionally substituted by a halogen atom, by an

optionally halogenated (C_1-C_5)alkyl group or by an optionally halogenated (C_1-C_5)alkoxy group;

Y represents -OH; (C_1-C_5)alkoxy; or the $-NR_cR_d$ group (in which R_c and R_d independently represent a hydrogen atom; (C_1-C_5)alkyl; (C_3-C_8)cycloalkyl optionally substituted by a halogen atom, by optionally halogenated (C_1-C_5)alkyl or by optionally halogenated (C_1-C_5)alkoxy; (C_6-C_{10})aryl optionally substituted by a halogen atom, by optionally halogenated (C_1-C_5)alkyl or by optionally halogenated (C_1-C_5)alkoxy;

Or Y represents glucomic acid



it being understood that one and one alone from R_1 and R_2 represents the Z chain;

and their pharmaceutically acceptable salts with acids or bases, or esters.

2. The use according to Claim 1, characterized in that A represents the divalent radical $-(CH_2)_s-CR_3R_4-(CH_2)_t-$ in which s, t, R_3 and R_4 are as defined in Claim 1.

3. The use according to Claim 1, characterized in that:

X represents O;

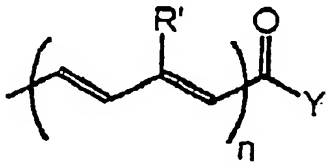
A represents $-CR_3R_4-$ or $-CH_2-CR_3R_4-$ in which the unsubstituted methylene group is bonded to X;

R_1 and R_2 independently represent Z; H; (C_1-C_{15})alkyl; (C_2-C_{15})alkenyl; or phenyl optionally substituted by (C_1-C_5)alkyl, (C_1-C_5)alkoxy, a halogen atom or $-CF_3$;

R_3 and R_4 independently takes any one of the meanings given above for R_1 and R_2, with the exception of Z;

R is chosen from (C_1-C_9)alkyl; (C_1-C_5)alkoxy; phenyl or phenylcarbonyl optionally substituted by a halogen atom, (C_1-C_5)alkyl, (C_1-C_5)alkoxy, $-CF_3$ or $-OCF_3$; a halogen atom; $-CF_3$ and $-OCF_3$;

Z represents the radical:



where n represents 1; and

R' represents (C_1-C_5)alkyl or (C_6-C_{10})aryl.

4. The use according to any one of Claims 1 to 3, wherein :

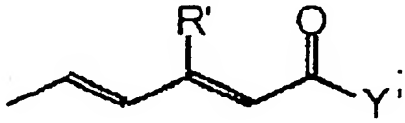
X represents O;

A represents $-CH_2-CR_3R_4-$ in which the unsubstituted methylene group is bonded to X;

R_1 and R_2 independently represent Z, a hydrogen atom or (C_1-C_5)alkyl;

R_3 and R_4 independently takes any one of the meanings given above for R_1 and R_2, with the exception of Z;

Z represents

 ; and

R' represents methyl or phenyl.

5. The use according to anyone of claims 1 to 4, wherein R1 represents Z.

6. The use according to anyone of claims 1 to 5, wherein R_2 represents a hydrogen atom.

7. The use according to anyone of claims 1 to 6, wherein Y is a (C_1-C_5) alkoxy.

8. The use according to any one of Claims 1 to 6, wherein :

Y represents -OH; (C_1-C_5)alkoxy; or -NR_cR_d in which R_c and R_d are as defined in Claim 1.

9. The use according to anyone of claims 1 to 8, wherein R' is methyl.

10. The use according to any of claims 1 to 9, wherein R is (C_1-C_5) alkoxy.

11. The use according to any one of Claims 1 to 6, wherein p represents 0, 1 or 2.

12. The use according to claim 1, wherein :

[X represents O ;

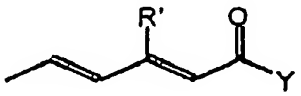
A represents -CH_2-CR_3R_4- in which the unsubstituted methylene group is bonded to X ;

R_1 is Z and R_2 is H;

R_3 and R_4 independently represents a (C_1-C_5) alkyl group;

R is a (C_1-C_5) alkoxy;

Z represents



;

wherein R' represents a methyl or phenyl ; and y represents a (C_1-C_5)alkoxy].

13. The use according to claim 1 wherein said derivative is selected from the group consisting of

- (2E, 4E)-5-(2-pentyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2Z, 4E)-5-(2-pentyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(2,2-dimethyl-6-methoxy-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;

- (2E, 4E)-5-(2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(2,2-dimethyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2Z, 4E)-5-(2,2-dimethyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-[2-(non-6-enyl)-2H-1-benzopyran-3-yl]-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(4-phenyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(6-nonyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(6-phenyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(2-nonyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(4-methyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2Z, 4E)-5-(2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(2-undecanyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(2-phenyl-2H-1-benzopyran-3-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(5-methyl-2,3-dihydrobenzoxepin-4-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-methoxy-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid; and
- (2E, 4E)-5-(2,3-dihydrobenzoxepin-4-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-methoxy-2,3-dihydrobenzoxepin-5-yl)-3-phenylpenta-2,4-dienoic acid;
- (2Z, 4E)-5-(3,3-dimethyl-7-methoxy-2,3-dihydrobenzoxepin-5-yl)-3-phenylpenta-2,4-dienoic acid;
- (2Z, 4E)-5-(3,3-dimethyl-7-methoxy-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;

- (2E, 4E)-5-(3,3-dimethyl-7,8-dimethoxy-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-2,3-dihydro-7-(para-chlorobenzoyl)benzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-chloro-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7,8-dichloro-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-bromo-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-fluoro-8-chloro-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-fluoro-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-trifluoromethyl-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-7-phenyl-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3,7-trimethyl-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(3,3-dimethyl-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;
- (2E, 4E)-5-(9-methoxy-3,3-dimethyl-2,3-dihydrobenzoxepin-5-yl)-3-methylpenta-2,4-dienoic acid;

and their pharmaceutically acceptable esters.

14. The use according to anyone of claims 1 to 13 wherein the diseases associated with hyperuricemia to be treated comprise one or several of the following : gout, acute inflammatory arthritis, tophaceous deposition of urate crystals in and around joints, chronic arthritis, deposition of urate crystals in renal parenchyma,

urolithiasis, and related renal disease also termed gouty nephropaty.

15. The use according to anyone of claims 1 to 13 wherein the hyperuricemiae to be treated comprises primary and secondary hyperuricemiae, such as drug related to hyperuricemiae (e.g. by diuretics, immunosuppressive of cytotoxic agents), or hyperuricemiae related to diverse medical conditions (e.g. nephropaties, myeloproliferative disorders, conditions associated with insuline resistance and transplantations).

16. The use according to any one of claims 1 to 13 to prepare medicaments for subjects having serum uric acid levels, before treatment, equal or above 7 mg/dL (420 %m/L).

17. The use according to claim 16 where the conditions to be treated are gout or any condition brought about by high levels of uric acid in the joints or kidneys or a serum level over 9 mg/dL (530µ mol/L).

18. The use according to any of claims 1 to 17 for preparing a medicament suitable for administering the 2,4-pentadienoic acid derivative of formula (I) by the oral route.

19. The use according to one of claims 1 to 18 for preparing a medicament for administering the effective amount of 2,4-pentadienoic acid or derivative according to formula (I) once or twice per day.

20. The use according to any one of claims 1 to 19, wherein the amount of said pentadienoic acid derivative is substantially lower than the amount needed for the relevant derivative as used in the treatment of dyslipidemia, atherosclerosis and diabetes.

21. The use according to claim 20 wherein said amount is at least 50% lower.

22. The use according to claim 21 wherein said amount is at least 90% lower.

23. The use according to any one of claims 1 to 20, wherein the amount of said pentadienoic acid derivative is from 0.15 to 4 mg/Kg of human body weight.

24. The use according to claim 23, wherein said amount is from 0.3 to 1.0 mg/Kg human body weight.

25. The use according to one of claims 1 to 24 wherein said derivative is (2E,4E)-5-(3,3-dimethyl-7-methoxy-2,3-dihydrobenzo-xepin-5-yl)-3-methylpenta-2,4-dienoic acid, or its pharmaceutically acceptable salts or esters, among which its ethyl ester.

26. New medical compositions for the treatment of hyperuricemiae and/or the above mentioned associated diseases or disorders and/or for reducing serum uric acid levels which comprise, in a vehicle acceptable for a human, an effective amount of at least one 2,4-pentadienoic acid derivative as defined in anyone of claims 1 to 13.

27. Medical compositions according to claim 26 wherein this effective amount is substantially lower than the amount needed for the relevant 2,4-pentadienoic acid derivative used in the treatment of dyslipidaemia, atherosclerosis and diabetes.

28. Medical compositions according to claim 27 wherein this effective amount is at least 50% lower.

29. Medical compositions according to claim 28 wherein this effective amount is at least 90% lower.

30. Medical compositions according to claim 26 wherein the effective amount in a dose for a one day administration for an adult is from 0.15 to 4 mg/kg of a human body.

31. Medical compositions according to anyone of claims 26 to 30, wherein said effective amount is from 0.3 to 1.0 mg/Kg of a human body.

32. Medical compositions according to anyone of claims 26 to 31 formulated for oral administration.

33. A medicament according to anyone of claims 26 to 32 wherein said derivative is (2E,4E)-5-(3,3-dimethyl-7-methoxy-2,3-dihydrobenzo-xepin-5-yl)-3-methylpenta-2,4-dienoic acid, or its pharmaceutically acceptable salts or esters, among which its ethyl ester.